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# Fire Severity

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## Purpose:

- In this activity, students will examine different levels of fire severity as well as the absence of fire in an ecosystem to examine immediate and short-term effects that fire has on an ecosystem, and how fire affects plants and animals.

## Objectives:

Students will:

- Demonstrate, graph and describe ways that different fire severities and fire absence affect the forests of the Klamath-Siskiyou Mountains.
- Describe immediate and short-term effects of fire in forests of the Klamath-Siskiyou Mountains.
- Describe the patchwork mosaic burn pattern of a forest fire and its effects on the plants and animals that live in the forest.

## Materials:

Not provided in this kit:

- Pencil/pen or dry-erase marker.
- Colored pencils or pens for each student.
- Clipboards (optional)

Activity:

- **Fire Severity Materials Packet** including:
  - **Fire Severity photos** (4)
  - **Plant cards** (38)
  - **Laminated Fire Effects Script and Data Sheets** (1)
  - **Laminated Student Data Packets** (5)
  - **Laminated Example Graphs Packets** (5)
  - **Student Data Packet Teacher Key**
  - **Laminated Fire Effects Script Props** (campfire, lighting bolt, match, and storm cloud)
- **1 Quartz Fire Satellite Burn Intensity map** (brown folder)

**Time Required:** 90 Minutes

**Appropriate grades:** 6<sup>th</sup> -10<sup>th</sup>

**NGSS and Common Core Standards:**

**MS-LS2-4.** Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

**MS-LS2-2.** Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

**W.3.2:** Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

**HS-ESS3-1.** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.



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- 15 to 35 students (Works best with at least 25 students)

## Activity:

<p><b>Introduction</b></p>	<p>Choose a large open place outdoors to conduct the activity. To conduct the activity indoors move desks and chairs to the edge of the classroom.</p> <p>Show the students the photos of the low-severity, moderate-severity, and high-severity fires. Ask the class to describe how the photos differ from one other. Ask them to predict the effects of each fire on the species living and growing in the forest, both immediately after, and one year after, the fires took place. Ask the students to brainstorm ways in which fire might harm some species and help other species.</p> <p>Discuss the meaning of the word “severity” and how it can describe fire. Discuss how the amount, and type, of fuel (things that can burn), humidity, temperature and wind can all affect fire severity. <i>(Fire requires three elements: oxygen, fuel and heat. Low humidity, fuel accumulation, and high temperatures, can all cause fire. Wind spreads fire, especially in warm, dry conditions.)</i></p>
<p><b>Body</b></p>	<p><u>Fire Severity Demonstration</u></p> <p>*Use the <b>Fire Effects Script and Data Sheets</b> as a guide during this section.</p> <ol style="list-style-type: none"> <li>1) Tell the students that as a class they are going to act out how the different levels of fire-severities affect the plants growing in a forest. Specifically, they are going to act out how the number of trees, shrubs and ground plants change with low-, moderate- and high-severity fires. Tell the students that you will record the number of each type of plant for each type of fire. The class will compare the effects of the fire-severities at the end of the activity.</li> </ol> <p><b>Note:</b> Each demonstration will generate different data. The activity works best when you use at least 25 students, although the activity can be done with fewer students. Using too few students will result in data that may not truly represent the effects of each fire-severity.</p> <p>Have the students stand up and spread out around the classroom or in an open area outside and have them spread out at least one arm’s length from each other.</p>



Tell each student that they each represent one plot of land in a healthy forest. Shuffle and pass out a **Healthy Forest card** to each student. The card will tell them if a tree, shrub or ground plant lives on their plot of land.

Have the students act out their type of plant; if they are a tree, have them spread their arms above their heads; if they are a shrub, have the students crouch down; if they are a ground plant, have them sit or lay on the ground.

Count and tally the number of trees, shrubs, and ground plants in the “Before Fire” table on the **Low-Severity Fire Effects Script and Data Sheet**.

Tell the students that you (the teacher) represent fire, and you have a story to tell them. Tell them that if you tap them on the shoulder during your story, then the plant that lives on their plot of land has caught fire, and they must leave the forest (dramatically, if you choose). Designate an area for these students to go; once burned, they can move to the perimeter of the room or sit at the edge of the forest. You can also have a student be the prop volunteer and they can show and use the different props when they are read throughout the script.

Read the script aloud to the class as you walk through the forest. Tag students as directed by the card.

Tally the surviving plants in the “Immediately After the Fire” table on the **Low-Severity Fire Effects Script and Data Sheet**.

Before continuing the story ask the students what they notice about the landscape and who died and who survived?

Finish telling the story, and record the number of trees, shrubs and ground plants in the “One Year After Fire” table.

Before moving to the next the next story ask the students what they notice about the landscape and how it has changed? Is it all bad? Who



benefited and who didn't?

Tell the students that you are moving to a new section of the forest where a different type of fire will occur. Have the students move around and find a new "plot" of land in the forest. Have the students resume the role of the plant on the front of their card. Repeat the demonstration for the moderate-severity and high-severity fires, as well as the fire absence effects.

When the class acts out the fire absence effects, tell the students that the forest may not change because of fire, but they will need to listen carefully to the story and follow your instructions.

Before you bring the students back to the classroom, show them the photo of the forest several years after a severe fire (the **Fire Effects photo**). Have them identify what kinds of plants dominate the landscape (ground plants, with a few shrubs).

After the game discuss the following questions:

- How did the different fire severities affect the forest in different ways?
- How did the forest change in the absence of fire?
- Which plant population benefited the most from each fire-severity type?
- Which was most harmed by each fire-severity type?
- How might this affect the animals living in the forest?

#### Fire Severity Data Analysis

\*Use the **Student Data Packets** as a guide for this section.

Return to the classroom and take out the **Student Data Packets**. Tell the students that they will now be analyzing the data you collected during the demonstration to see how the different fire-severities affected the different types of plants.

**Note:** This section can be done individually, in pairs or groups, or as a class. Pass out appropriate amount of packets or make copies of the student packets if your class needs more.

Fill in the tables with the class data. If you plan on having the class make graphs themselves make the first graph together as a class and then have the students create a line graph for each fire severity, graphing its effect



	<p>on trees, shrubs and ground plants. Then have the students create a bar graph for each plant type, graphing the population changes for each fire-severity. <b>Don't include the fire absence effects in the bar graph because the units are different.</b></p> <p>Show the students the <b>Quartz Fire Satellite Burn Intensity map</b>. Have them discuss the questions on page 6 of the <b>Student Data Packet</b> as a group. For this activity, intensity and severity mean the same thing. <b>Note:</b> If you want to skip this step, show the students the <b>Example Graphs</b>, which show the data you will get if you use the complete set of <b>Healthy Forest cards</b> in the demonstration.</p>
<b>Closure</b>	<p>After students have finished their <b>Student Data Packet</b> have the students discuss their responses to the questions on page 6.</p> <p>See teacher key for answer keys</p>

## Additional Activities:

- Take a field trip to a historically burned forest to see fire burned trees or to a managed forest that has cleared fuel in the understory of the forest. Students could meet with a forest manager to talk more about how these forests are managed and how to incorporate different stakeholders into their plans.

## Modifications

- If you do not have enough time to have the students analyze data and make graphs you can skip this step and show the students the **Example Graphs**, which show the data you will get if you use the complete set of **Healthy Forest cards** in the demonstration.
- Students can also draw different fire severities instead of making graphs.
- Orthopedic impairment students can read the scenarios, be the fire, counter, or be in charge of the props throughout the story.
- For TAG learners you could incorporate management into the lesson and have students look up management practices in the local area. You can use the fuel management posters to help students grasp fuel management practices. This would be a great homework assignment if you are planning on going out to a managed forest or historically burned site to talk to a forest manager.

